## Claims

Pursuant to 37 CFR § 1.121(c), please amend the claims as shown in the following Listing Of Claims.

## Listing Of Claims

1. (Canceled)

2. (Currently Amended) The method of claim ~~1~~ 3 wherein the computationally less expensive floating point operations are from a group comprising addition, subtraction, multiplication, square root, reciprocal square root, and reciprocal floating point operations.

3. (Currently Amended) ~~The method of claim 1~~

On a sensory reproduction system having a processor with an instruction set including at least a computationally expensive floating point power function and a set of computationally less expensive floating point operations, a method of using said processor for efficiently converting sensory data between a perceptual data representation and a physical data representation, where the perceptual data representation is related to the physical data representation by an expression involving a power function, the method comprising:

performing a plurality of the computationally less expensive floating point operations on an item of the sensory data;

combining results of the plural performed operations to yield an approximation of a result of the power function on the sensory data item, wherein the combining results of the plural performed operations comprises performing a weighted mathematical combination of the results, where the weighted mathematical combination is from a group comprising a mean, sum and difference;

evaluating the expression using the approximation to provide a converted sensory data item; and

reproducing a physical sensation based on the perceptual data representation,

wherein the combining results of the plural performed operations comprises performing a mathematical combination of the results, where the mathematical combination is from a group comprising arithmetic mean, harmonic mean, weighted sum and weighted difference.

4. (Canceled).

5. (Currently Amended) The method of claim ~~1~~ 3 where the instruction set includes at least single instruction, multiple data floating point operation instructions, the method further comprising:

executing a single instruction, multiple data floating point operation instruction to perform a first of the computationally less expensive floating point operations on multiple items of the sensory data together.

6. (Previously amended) An imaging system comprising:

a display monitor;

a display unit operative to display an image on the display monitor, where the image is represented by perceptual image data comprising a plurality of color pixel data specifying colors in a perceptual color space, the perceptual color space having a non-unity gamma;

a physical image processor operative to perform an image processing operation on physical image data in which color pixel data specifies colors in a physical color space, the physical color space having a unity gamma within a range; and

a perceptual/physical image converter operating to convert the perceptual image data to the physical image data according to a perceptual-to-physical conversion expression involving a power function so as to permit the physical image processor to perform the image processing operation prior to display, and to convert the physical image data back to the perceptual image data according to a physical-to-perceptual conversion expression involving an inverse power function after the image processing operation for display on the display monitor, the perceptual/physical image converter approximating the power function and the inverse power function as a weighted mathematical combination of plural computationally inexpensive floating point operations on items of the image data;

wherein the perceptual/physical image converter operates to convert color values of the color pixel data within the range to have the unity gamma in the perceptual color space, while leaving color values of the color pixel data outside the range unaltered.

7. (Canceled).

8. (Original) The imaging system of claim 6 wherein the perceptual/physical image converter operates to approximate the power function as a weighted mean of floating point operations taken from a group comprising addition, subtraction, multiplication, square root and reciprocal operations.

9. (Original) The imaging system of claim 6 wherein the perceptual/physical image converter operates to approximate the power function as a weighted summation of floating point operations taken from a group comprising addition, subtraction, multiplication, square root and reciprocal operations.

10. (Original) The imaging system of claim 6 wherein the computationally inexpensive floating point operations comprise at least some of addition, subtraction, multiplication, square root and reciprocal operations.

11. (Previously Amended) An imaging system comprising:

a display monitor;

a display unit operative to display an image on the display monitor, where the image is represented by perceptual image data comprising a plurality of color pixel data specifying colors in a perceptual color space, the perceptual color space having a non-unity gamma;

a physical image processor operative to perform an image processing operation on physical image data in which color pixel data specifies colors in a physical color space, the physical color space having a unity gamma within a range; and

a perceptual/physical image converter operating to convert the perceptual image data to the physical image data according to a perceptual-to-physical conversion expression involving a power function so as to permit the physical image processor to perform the image processing operation prior to display, and to convert the physical image data back to the perceptual image data according to a physical-to-perceptual conversion expression involving an inverse power function after the image processing operation for display on the display monitor, the perceptual/physical image converter approximating the power function and the inverse power

function as a weighted mathematical combination of plural computationally inexpensive floating point operations on items of the image data;

wherein the perceptual color space has a gamma within a range of 1.7 to 2.5, and the perceptual/physical image converter approximates a computationally expensive power function with an exponent also in the range of 1.7 to 2.5 as a weighted mathematical combination of power functions in a similar range composed of addition, subtraction, multiplication, square root and reciprocal operations.

12. (Previously Amended) An imaging system comprising:

a display monitor;

a display unit operative to display an image on the display monitor, where the image is represented by perceptual image data comprising a plurality of color pixel data specifying colors in a perceptual color space, the perceptual color space having a non-unity gamma;

a physical image processor operative to perform an image processing operation on physical image data in which color pixel data specifies colors in a physical color space, the physical color space having a unity gamma within a range; and

a perceptual/physical image converter operating to convert the perceptual image data to the physical image data according to a perceptual-to-physical conversion expression involving a power function so as to permit the physical image processor to perform the image processing operation prior to display, and to convert the physical image data back to the perceptual image data according to a physical-to-perceptual conversion expression involving an inverse power function after the image processing operation for display on the display monitor, the perceptual/physical image converter approximating the power function and the inverse power function as a weighted mathematical combination of plural computationally inexpensive floating point operations on items of the image data;

wherein the perceptual color space has a gamma within a range of 1.7 to 2.5, and the perceptual/physical image converter approximates a computationally expensive inverse power function with an exponent in the range of –1/1.7 to –1/2.5 as a weighted mathematical combination of power functions composed of addition, subtraction, multiplication, square root and reciprocal operations.

13. (Previously Amended) An imaging system comprising:

a display monitor;

a display unit operative to display an image on the display monitor, where the image is represented by perceptual image data comprising a plurality of color pixel data specifying colors in a perceptual color space, the perceptual color space having a non-unity gamma;

a physical image processor operative to perform an image processing operation on physical image data in which color pixel data specifies colors in a physical color space, the physical color space having a unity gamma within a range; and

a perceptual/physical image converter operating to convert the perceptual image data to the physical image data according to a perceptual-to-physical conversion expression involving a power function so as to permit the physical image processor to perform the image processing operation prior to display, and to convert the physical image data back to the perceptual image data according to a physical-to-perceptual conversion expression involving an inverse power function after the image processing operation for display on the display monitor, the perceptual/physical image converter approximating the power function and the inverse power function as a weighted mathematical combination of plural computationally inexpensive floating point operations on items of the image data;

wherein the perceptual color space is the sRGB color space, and the perceptual/physical image converter approximates a power function with exponent of 2.4 as a weighted harmonic mean of the power functions $x^{-2}$ and $x^{-2.5}$ evaluated as the square of the reciprocal and the reciprocal square root, respectively.

14. (Original) The imaging system of claim 13 the perceptual/physical image converter approximates the power function with exponent of 2.4 by evaluating the expression,

$$x^{2.4} \approx \frac{1.285}{(0.285 + x^{-0.5})x^{-2}}.$$

15. (Previously Amended) An imaging system comprising:

a display monitor;

a display unit operative to display an image on the display monitor, where the image is represented by perceptual image data comprising a plurality of color pixel data specifying colors in a perceptual color space, the perceptual color space having a non-unity gamma;

a physical image processor operative to perform an image processing operation on physical image data in which color pixel data specifies colors in a physical color space, the physical color space having a unity gamma within a range; and

a perceptual/physical image converter operating to convert the perceptual image data to the physical image data according to a perceptual-to-physical conversion expression involving a power function so as to permit the physical image processor to perform the image processing operation prior to display, and to convert the physical image data back to the perceptual image data according to a physical-to-perceptual conversion expression involving an inverse power function after the image processing operation for display on the display monitor, the perceptual/physical image converter approximating the power function and the inverse power function as a weighted mathematical combination of plural computationally inexpensive floating point operations on items of the image data;

wherein the perceptual color space is the sRGB color space, and the perceptual/physical image converter approximates an inverse power function with exponent of –1/2.4 as a weighted arithmetic mean of the power functions $x^{0.5}$ and $x^{0.375}$.

16. (Original) The imaging system of claim 15 wherein the perceptual/physical image converter approximates the inverse power function with exponent of –1/2.4 by evaluating the expression, $x^{1/2.4} \approx w\sqrt{x} + (1-w)\frac{\sqrt{x}}{\sqrt{\sqrt{\sqrt{x}}}}$, where w is a weighting factor.

17. (Original) The imaging system of claim 15 wherein the perceptual/physical image converter approximates the inverse power function with exponent of –1/2.4 by evaluating the expressions, $y' = 0.78x^{0.5} + 0.22x^{0.25}$ and $x^{1/2.4} \approx \frac{1}{3}\left(2y' + \frac{2x^{1.25}}{y'^2}\right) - b$, where b is an offset.

18. (Original) The imaging system of claim 6 further comprising:

a computer processor having in instruction set including at least one single instruction, multiple data floating point operation instruction;

wherein the perceptual/physical image converter approximates the power function and the inverse power function by evaluating an expression combining exponential functions composed of at least one of square, square root and reciprocal operations performed using the at least one single instruction, multiple data floating point operation instruction.

19. (Canceled)

20. (Canceled)

21. (Canceled)

22. (Canceled)

23. (Canceled)